

Summary of Milwaukee County COVID-19 infections associated with outbreaks in group quarters and other settings as compared to cases not attributable to an outbreak

Milwaukee County COVID-19 Epidemiology Intel Team

This report was updated on September 03, 2020 and includes data from March 01, 2020 through September 01, 2020.

Overview

This report examines patterns of COVID-19 cases attributable to an identified outbreak (defined as 2 or more cases associated with a facility or event, or 1 or more cases if that facility is a nursing home) as compared to cases not attributable to an outbreak. We further examine whether outbreaks occurred in a group quarters (GQ) setting (e.g. senior care facility, prison) or in a facility or event without group quarters (e.g. factory, food processing plant, bar or restaurant, school or childcare setting, wedding). We examine cases, hospitalizations, and deaths and explore differences by demographic factors (age, sex, city) as well as facility type. All plots draw upon Wisconsin Electronic Disease Surveillance System (WEDSS) data for Milwaukee County. The specimen collection date is used for both case and hospitalization focused analyses, as hospital admission dates are incomplete.

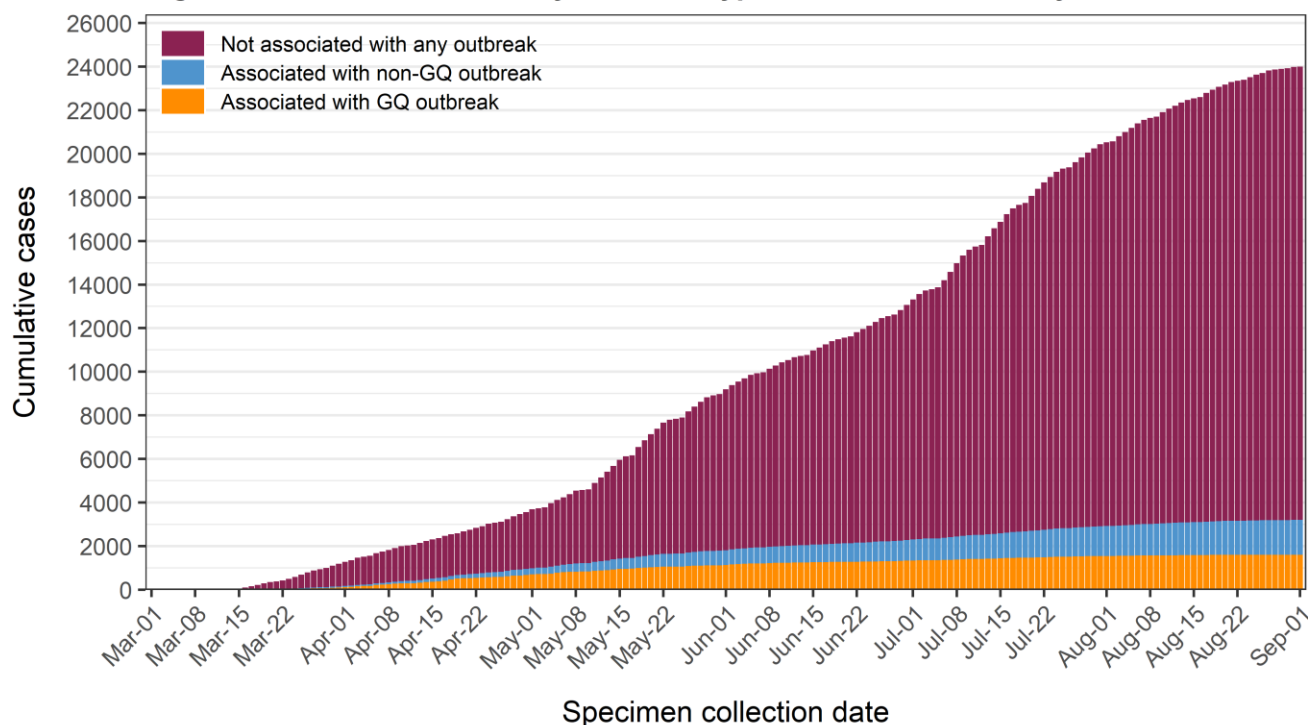
Please note, this analysis is subject to limitations of the WEDSS database. The outbreak designation is based on information collected during contact tracing interviews. Some cases may not be available for interview and recent cases may not have been interviewed yet; these cases are categorized as having no known outbreak association. Testing totals for outbreak categories only include negative tests with a known outbreak association. For example, a facility could have a testing event and if there are no resulting cases, these negative tests would not be included in our testing totals for the corresponding outbreak setting.

Summary: COVID-19 Confirmed Cases

The figures below illustrate the pattern of confirmed COVID-19 cases among the three groups of interest in this report: (1) cases attributable to an outbreak in group quarters (i.e., a congregate living facility), (2) cases attributable to an outbreak outside of group quarters, and (3) cases not attributable to an outbreak. **Figure 1** illustrates the cumulative number of each type of case over time. Most cases in Milwaukee County have not been attributable to a known outbreak (N = 20795, 86.7%). There was a steady rise in cases until early May, when we observed a steeper rise which co-occurred with increased testing capacity (including two testing sites opened in the city of Milwaukee on May 11th). Cases then accumulated more gradually in June and the increase became steeper again in early July. Among cases attributable to an outbreak (N = 3202), the majority took place in a group quarters setting (N = 1603, 50.1%), with the rest taking place in other settings such as businesses (N = 1599, 49.9%). Of note, many facilities were closed during the duration of the Safer at Home order (March 26th – May 25th), while group quarters facilities such as nursing homes and correctional facilities continued to be operational.

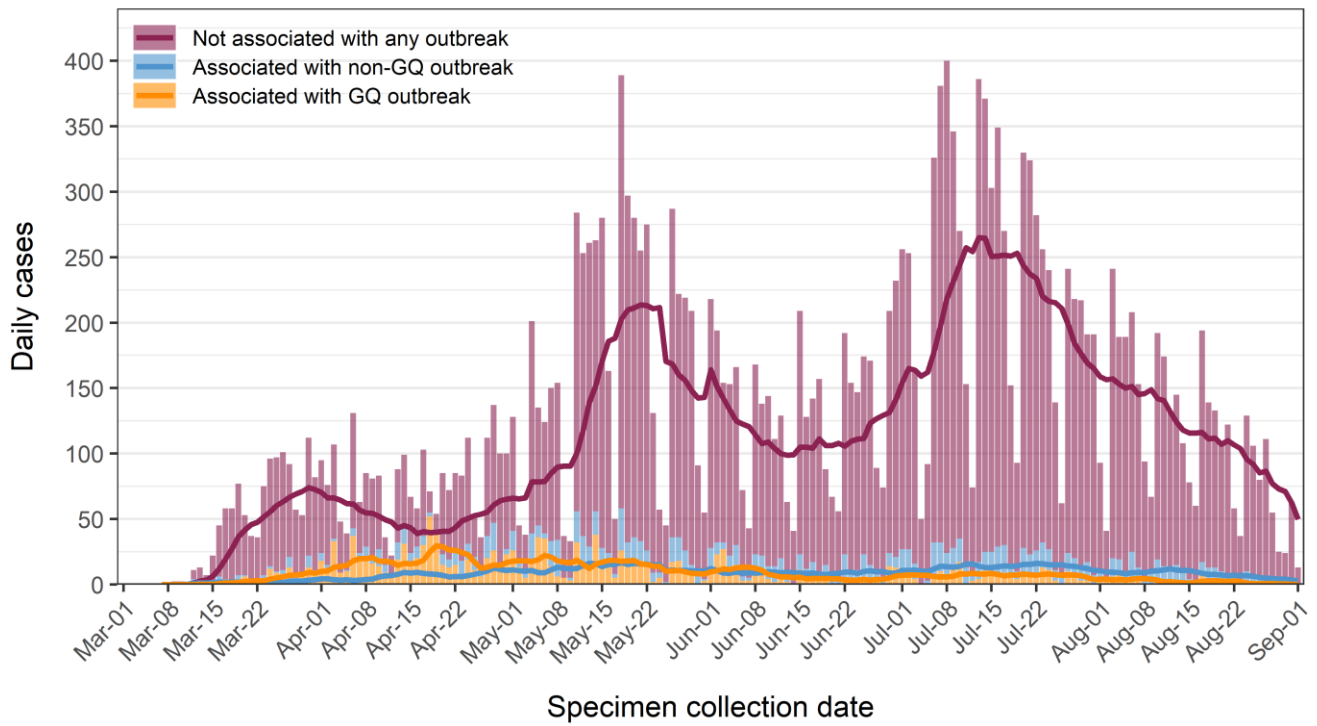
Figure 2 illustrates daily incidence, including bars to reflect daily counts and a line to illustrate a 7-day average to enhance visualization. Of note, three peaks for cases not attributable to an outbreak have been observed; the first in early April prior to expanded testing, the second occurring in mid- to late- May after the availability and frequency of testing increased, and the third and highest peak occurring in early July. A smaller rise and then fall for cases attributable to outbreaks was observed with a peak occurring around mid to late April.

Figure 1: Cumulative cases by outbreak type in Milwaukee County



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

Figure 2: Daily cases by outbreak type in Milwaukee County



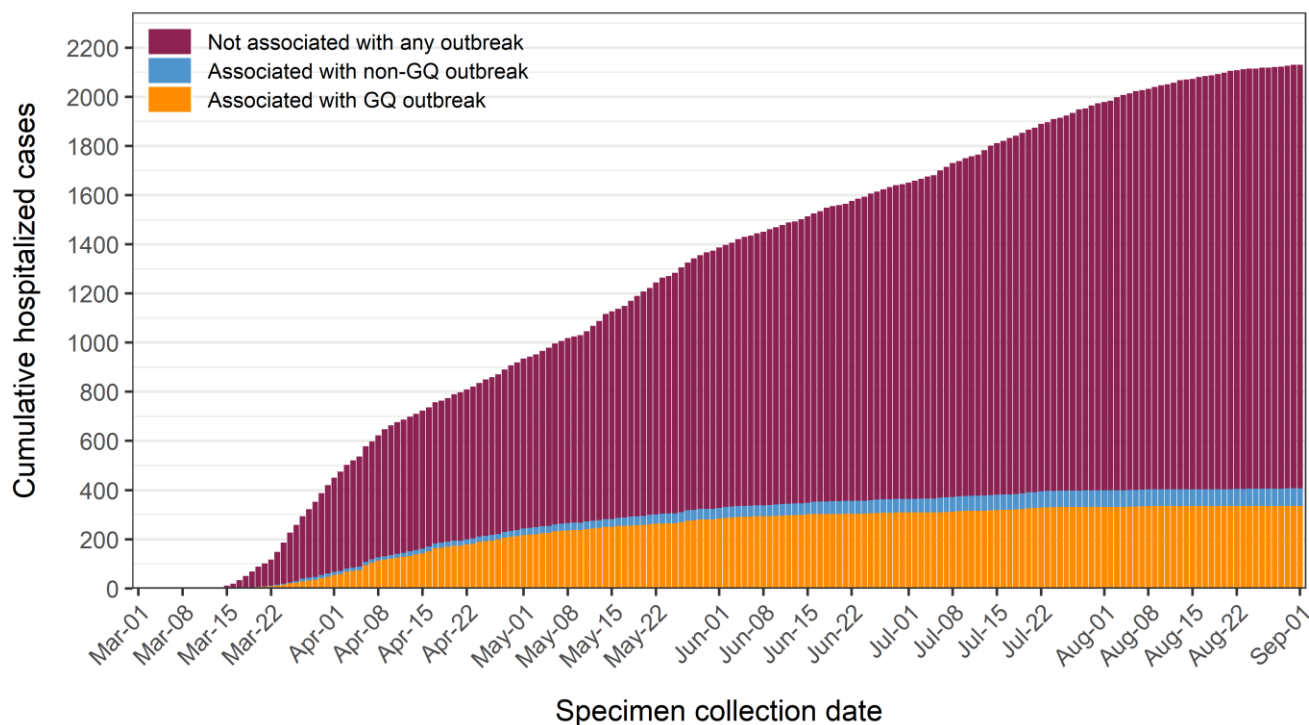
Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

Summary: COVID-19 hospitalizations

As shown in the figures below, the pattern of hospitalizations differs from that observed for cases. As shown in **Figure 3**, hospitalizations accumulated more quickly early in the epidemic and then have accumulated more gradually since mid-April. Of all hospitalized cases (N = 2130), most (N = 1723, 80.9%) were not attributable to an outbreak. Of those attributable to an outbreak (N = 407), the vast majority of hospitalized cases occurred among individuals living in group quarters facilities (N = 335, 82.3%).

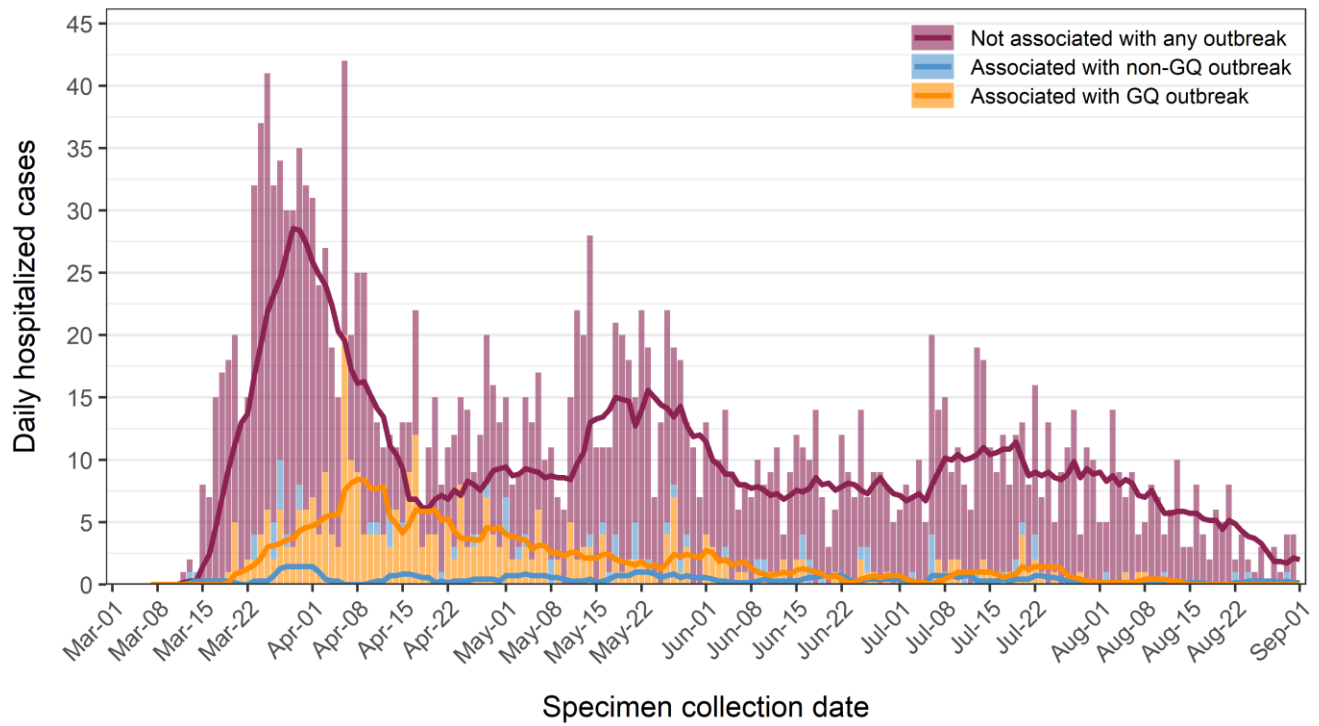
As shown in **Figure 4**, the highest peak of hospitalizations not attributable to an outbreak occurred in late March/early April, after which the number of hospitalizations decreased and then increased again in mid to late May, and a third time in July. Hospitalizations occurring among outbreak attributed cases in group living quarters were highest in early April and have declined since. Hospitalizations attributed to non-group quarters outbreaks have been low throughout the epidemic.

Figure 3: Cumulative hospitalized cases by outbreak type in Milwaukee County



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

Figure 4: Daily hospitalized cases by outbreak type in Milwaukee County



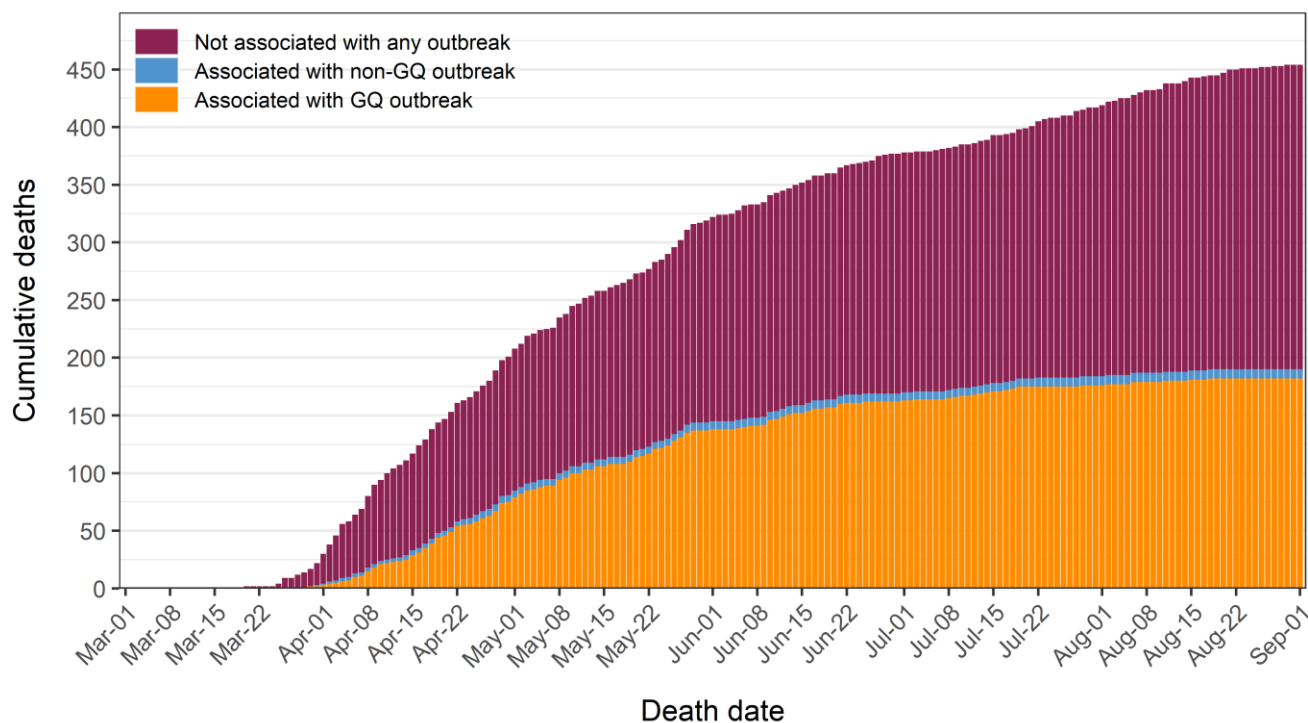
Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

Summary COVID-19 deaths

Figure 5 below illustrates the cumulative number of COVID-19 deaths among cases by outbreak type over time. While only 6.7% of all cases and 15.7% of all hospitalizations were attributable to a group quarters outbreak, 40.1% (N = 182) of all COVID-19 deaths in Milwaukee County occurred among cases in these settings. Many facilities in this category are nursing homes serving primarily elderly populations, who are known to have more severe COVID-19 outcomes.

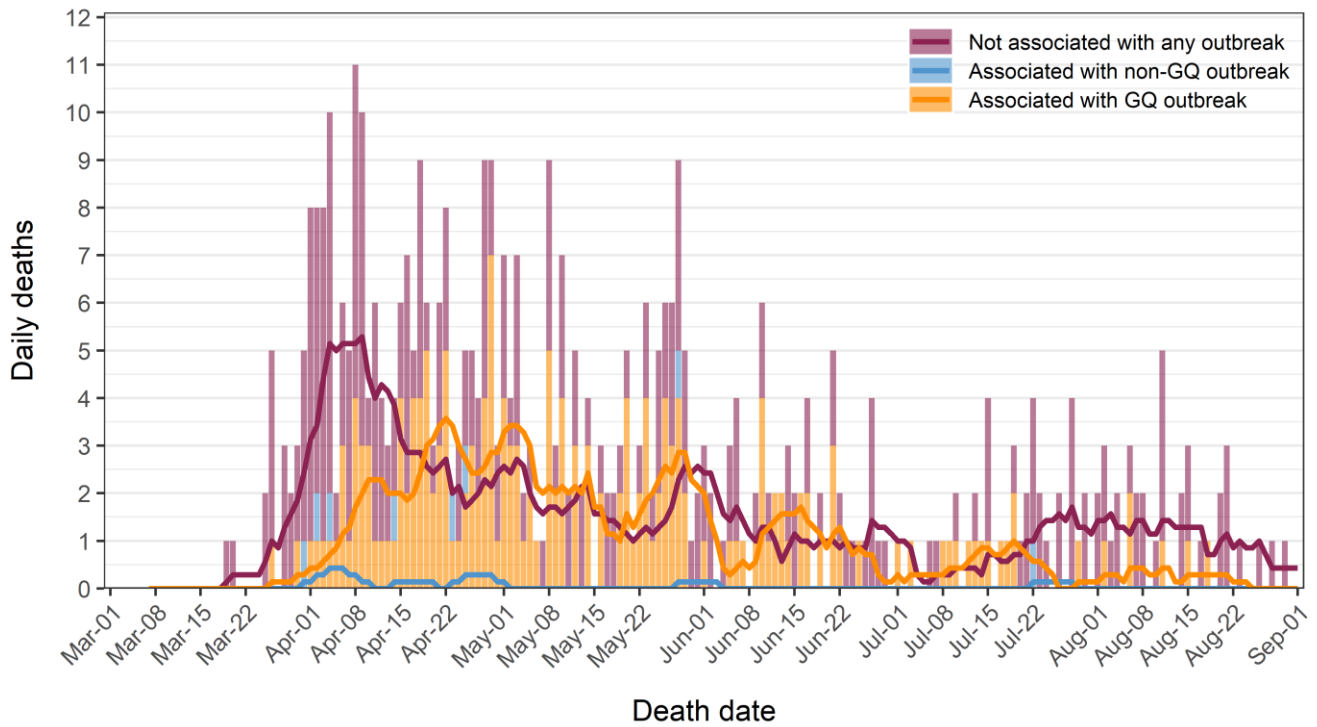
As shown in **Figure 6**, the number of deaths in group quarter-associated outbreaks was highest in late April and early May. In contrast, most deaths among cases not attributable to an outbreak occurred earlier in the epidemic, peaking around early April, with smaller peaks later in the course of the epidemic. In total, 264 cases not attributable to an outbreak died from COVID-19 (58.1% of all deaths). Again, few deaths among cases attributable to an outbreak in a non-group quarter setting have occurred (N = 8), comprising only 1.8% of all deaths.

Figure 5: Cumulative deaths by outbreak type in Milwaukee County



Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

Figure 6: Daily deaths by outbreak type in Milwaukee County

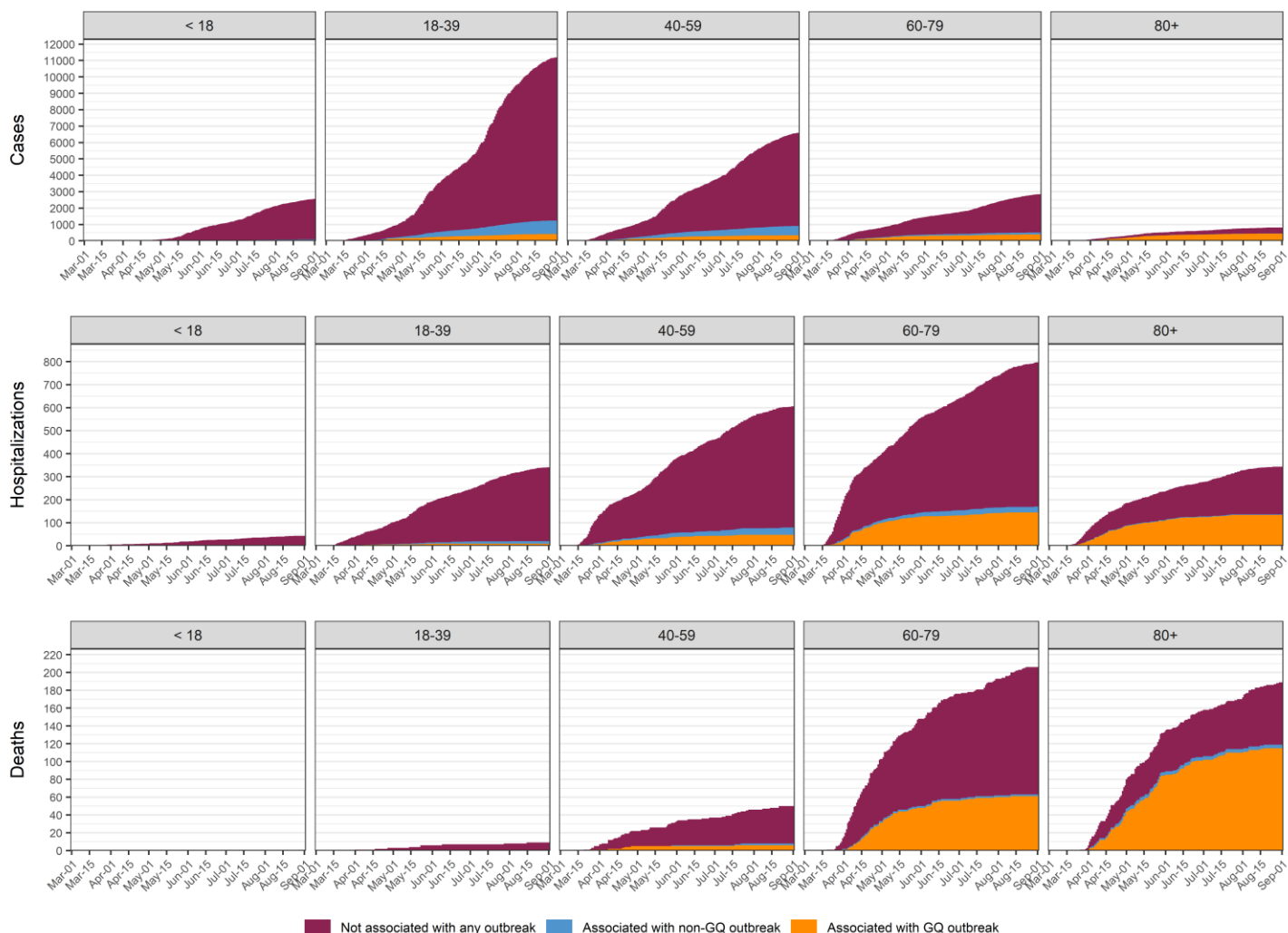


Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)
Created by the Milwaukee County COVID-19 Epidemiology Intel Team

Age profiles of cases by outbreak and group quarters status

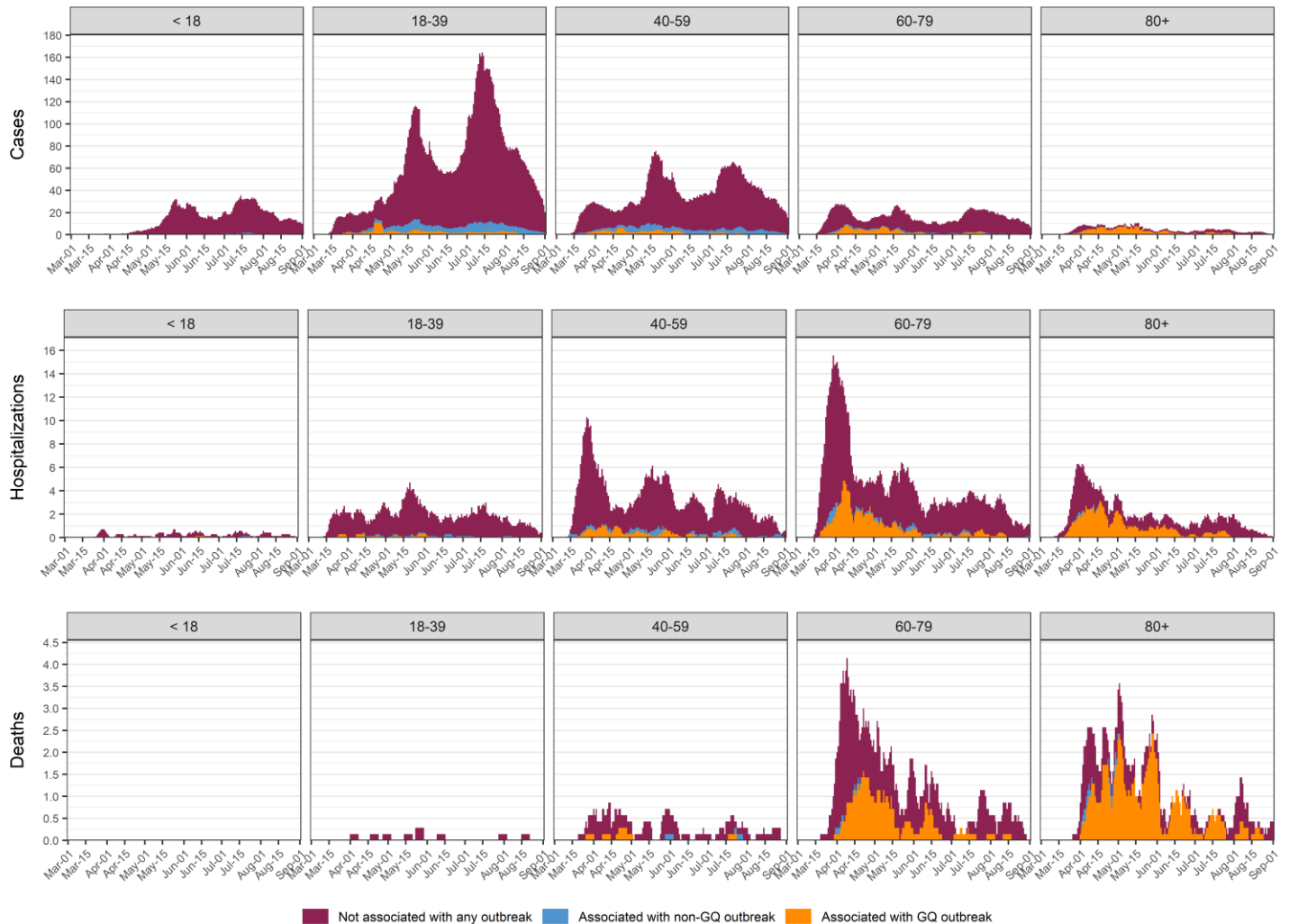
As shown in **Figure 7**, patterns of COVID-19 cases differ substantially across age groups, attribution to an outbreak, and outbreak type. Among children, cases and hospitalizations thus far have not been outbreak associated and no children have died. Among younger people aged 18-39, there was a very rapid and steep increase in non-outbreak cases beginning early in May and again in early July. Hospitalizations have increased gradually among this age group, and the vast majority of hospitalized cases in this age group have not been outbreak associated; very few young people have died. Among working age individuals aged 40-59, the proportion of cases and hospitalizations attributable to outbreaks, including those occurring in group living quarters, is larger compared to younger people. Deaths in this age group are mainly among non-outbreak cases. Among individuals aged 60-79, the pattern begins to shift to a much more significant influence of group quarters-based outbreaks, particularly for hospitalizations; a much larger proportion of hospitalizations and deaths are attributable to group living quarters outbreaks in this age group compared to younger cases. Among individuals aged 80+, 54.3% of cases have been attributable to outbreaks in group living quarter facilities. In this age group, 38.8% of all hospitalizations and 60.8% of all deaths have occurred among cases attributable to group living quarters outbreaks.

Figure 7: Cumulative incidence by age group



As shown in **Figure 8**, patterns of COVID-19 cases have also varied over time within each age group. Among children, two peaks in average daily incidence of cases have occurred in mid-late May and mid-July; average daily hospitalizations have occurred more consistently over time, dominated by infections not associated with an outbreak. Among young people (aged 18-39), there have been two distinct peaks in average daily incidence of non-outbreak cases, observed in mid-late May and mid-July, with smaller peaks of cases attributable to outbreaks outside of group quarters. In mid-April, a peak in group quarters attributed cases was observed in this age group, primarily driven by cases at the Milwaukee County House of Correction. Hospitalizations, mainly among non-outbreak cases, have been seen across time. For working age individuals aged 40-59, three peaks in average daily incidence have been observed, in early April, mid-late May, and mid-July, and cases have mostly been non-outbreak associated. Cases and hospitalizations due to group quarters outbreaks are mainly observed in April and early May among this age group, including some deaths. Among individuals aged 60-79, group quarters associated outbreaks contributed significantly to cases, hospitalizations and deaths early in the epidemic. For ages 80+, infections, hospitalizations and deaths were largely driven by group living quarters outbreaks early in the epidemic and have now largely decreased.

Figure 8: Average daily incidence (7-day rolling average) by age group



Race and ethnicity profiles of cases by outbreak and group quarters status

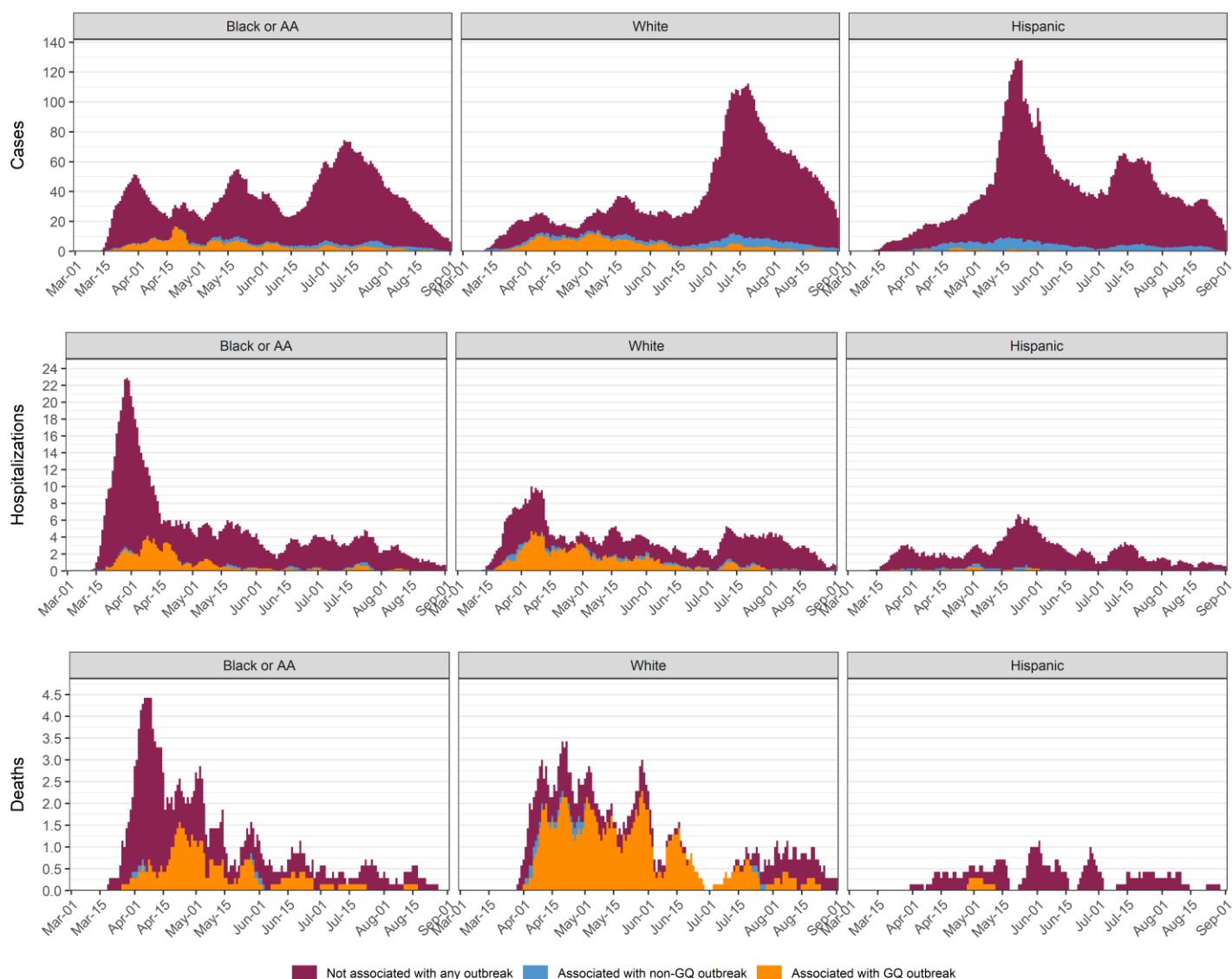
As shown in **Figure 9**, patterns of COVID-19 differ substantially by race and ethnicity. Among Hispanics, very few cases, hospitalizations or deaths are attributable to outbreaks in group living quarters; some cases are attributable to non-group quarters outbreaks, known in part to be related to food processing facilities. Among Whites, the picture is very different, with a much larger proportion of total cases attributable to outbreaks (17.8%), including in group quarters settings (10.4% of total cases). Further, a large proportion of hospitalizations and the majority of deaths are associated with group quarters outbreaks among Whites. Among cases identifying as Black, most cases, hospitalizations and deaths are not associated with a known outbreak, with steep initial accumulation of hospitalizations and deaths among these cases early on and a continuing accumulation of cases over time.

Figure 9: Cumulative incidence among Black, Hispanic and non-Hispanic White groups



As shown in **Figure 10**, patterns by race and ethnicity also differ over time. Early in the pandemic, the burden of cases, hospitalizations and deaths was greatest in the Black population and primarily not attributable to an outbreak. By mid-April, more cases in group quarters facilities had accumulated and led to hospitalizations and deaths. Since mid-May, most cases, hospitalizations, and deaths have not been outbreak associated and the burden of hospitalizations and deaths has declined. Among Whites, the early weeks of the pandemic were characterized by a predominance of cases, hospitalizations and deaths in group quarters facilities – particularly those serving elderly populations. The vast majority of deaths among Whites have been attributed to outbreaks in these facilities, such as nursing homes. Beginning in early July, there was a significant accumulation of new cases, including some hospitalizations and a few deaths. Among Hispanics, the epidemic began slowly; cases accumulated rapidly beginning with some cases in non-group quarters facilities and a large peak in non-outbreak cases in mid to late May, followed by a large decline. A recent increase in cases not attributable to outbreaks has been observed among this group since early July.

Figure 10: Average daily incidence (7-day rolling average) among Black, Hispanic and non-Hispanic White groups



Summaries by outbreak type

Below we summarize outbreak settings associated with the largest number of COVID-19 cases. An outbreak is defined as 2 or more cases associated with a facility or event; for nursing homes, the threshold is only 1 case. The top seven categories are presented below. The following totals include all individuals associated with the outbreak which may include residents, students, patrons, and employees.

Milwaukee County House of Correction

There was a significant outbreak at the Milwaukee County House of Correction (HOC) including 109 cases recorded in March and April when every inmate and employee was tested. Testing was performed again in early June with 2 new cases detected. The outbreak largely affected young Black males (mean age 33).

Figure 11: All tests associated with the HOC

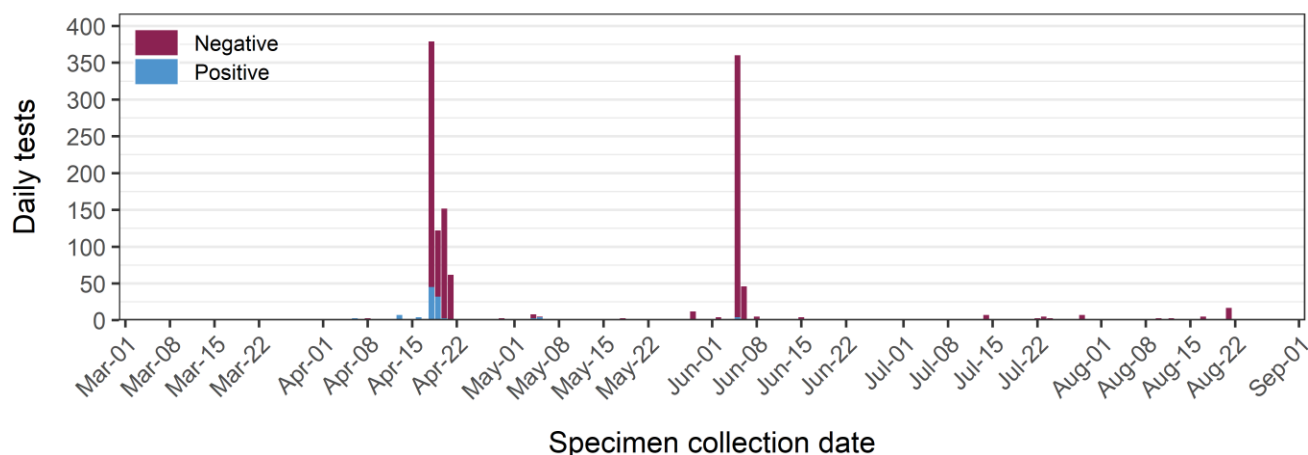


Table 1: Summary of 111 confirmed cases in the HOC (2 unique outbreak IDs)

| Confirmed cases (N = 111) | | |
|---------------------------------------|-----------------------------------|----------------------|
| Age | Mean (SD) | 33.10 (11.51) |
| | Median [Q1, Q3] | 30.00 [24.00, 39.50] |
| Age category | < 18 | <10 |
| | 18-39 | 81 (73.0 %) |
| | 40-64 | 27 (24.3 %) |
| | 65+ | <10 |
| | Unknown | <10 |
| Gender | Female | <10 |
| Race/Ethnicity | Black or AA | 70 (63.1 %) |
| | White | 17 (15.3 %) |
| | Hispanic | 15 (13.5 %) |
| | Other (<10 cases each) or Unknown | 9 (8.1 %) |
| Has patient been hospitalized? | Yes | <10 |
| Has patient died? | Yes | <10 |

Adult residential facilities

There has been a consistent burden of cases identified at adult residential facilities throughout the pandemic. High percentages of tests have been returned positive. These outbreaks have largely occurred among older (mean age 63), as well as non-Hispanic White (49.3%) and Black (37.3%) individuals and have resulted in a total of 327 hospitalizations and 182 deaths.

Figure 12: All tests associated with an adult residential facility outbreak

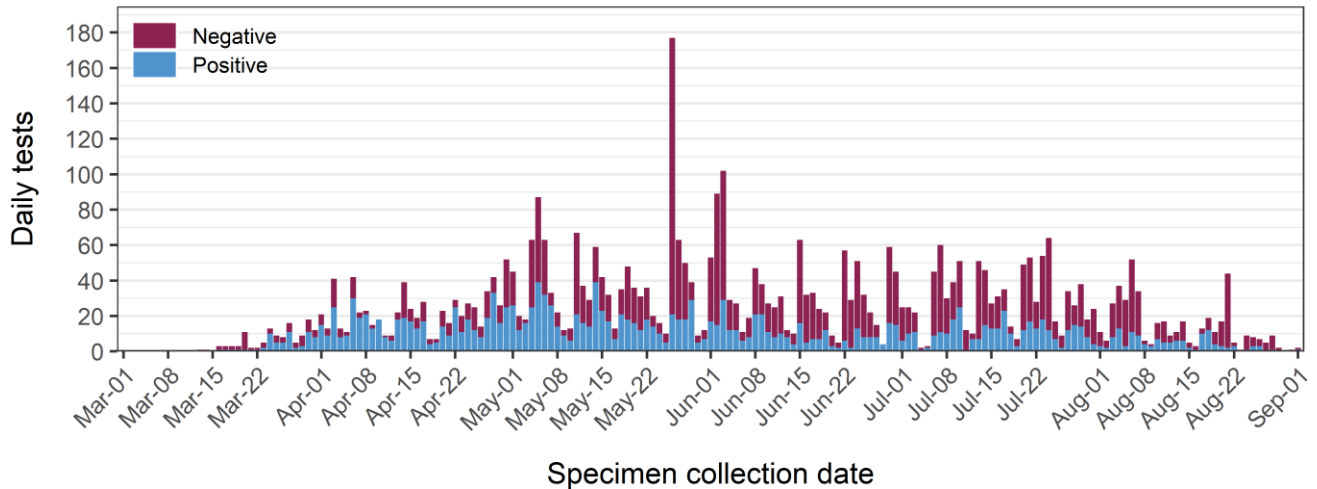


Table 2: Summary of 1405 confirmed cases in adult residential facilities (197 unique outbreak IDs)

| Confirmed cases (N = 1405) | | |
|---------------------------------------|-----------------------------------|----------------------|
| Age | Mean (SD) | 62.85 (23.39) |
| | Median [Q1, Q3] | 67.00 [43.00, 83.00] |
| Age category | < 18 | <10 |
| | 18-39 | 293 (20.9 %) |
| | 40-64 | 355 (25.3 %) |
| | 65+ | 749 (53.3 %) |
| | Unknown | <10 |
| Gender | Female | 1026 (73.0 %) |
| Race/Ethnicity | White | 693 (49.3 %) |
| | Black or AA | 524 (37.3 %) |
| | Hispanic | 66 (4.7 %) |
| | Other (<10 cases each) or Unknown | 122 (8.7 %) |
| Has patient been hospitalized? | Yes | 327 (23.3 %) |
| Has patient died? | Yes | 182 (13.0 %) |

Meat processing related

Meat processing plants have also been impacted significantly by COVID-19 outbreaks, with early outbreaks occurring in April and May and some cases identified more recently. A significant testing campaign took place among individuals working in such settings in late April. These outbreaks have resulted in 200 confirmed cases and 11 hospitalizations, primarily impacting working age (mean age 43) Hispanic adults.

Figure 13: All tests associated with a meat processing outbreak

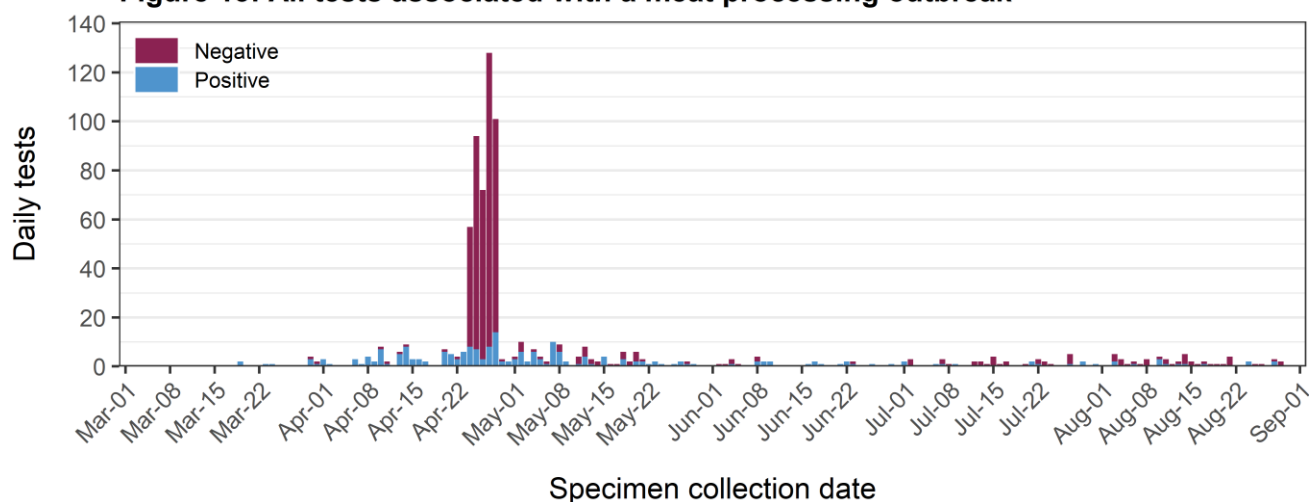


Table 3: Summary of 200 confirmed cases in meat processing facilities (9 unique outbreak IDs)

| Confirmed cases (N = 200) | | |
|---------------------------------------|-----------------------------------|----------------------|
| Age | Mean (SD) | 42.72 (13.69) |
| | Median [Q1, Q3] | 43.00 [33.00, 55.00] |
| Age category | < 18 | <10 |
| | 18-39 | 71 (35.5 %) |
| | 40-64 | 118 (59.0 %) |
| | 65+ | <10 |
| | Unknown | <10 |
| Gender | Female | 96 (48.0 %) |
| Race/Ethnicity | Hispanic | 104 (52.0 %) |
| | White | 44 (22.0 %) |
| | Asian | 23 (11.5 %) |
| | Black or AA | 21 (10.5 %) |
| | Other (<10 cases each) or Unknown | 8 (4.0 %) |
| Has patient been hospitalized? | Yes | 11 (5.5 %) |
| Has patient died? | Yes | <10 |

Other food plant related outbreaks

Other food related plants have also been affected by outbreaks. A total of 138 cases have been identified, affecting primarily Hispanic adults with a mean age of 40.

Figure 14: All tests associated with a (non-meat) food plant outbreak

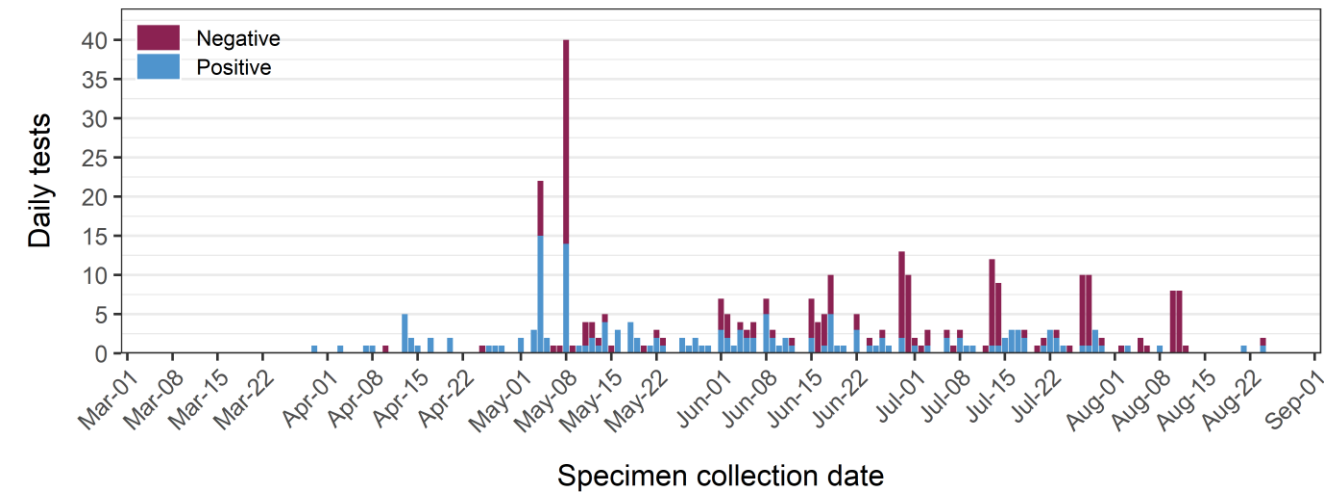


Table 4: Summary of 138 confirmed cases in (non-meat) food plants (20 unique outbreak IDs)

| Confirmed cases (N = 138) | | |
|--------------------------------|-----------------------------------|----------------------|
| Age | Mean (SD) | 39.83 (12.14) |
| | Median [Q1, Q3] | 39.00 [31.00, 48.00] |
| | | |
| Age category | < 18 | <10 |
| | 18-39 | 70 (50.7 %) |
| | 40-64 | 63 (45.7 %) |
| | 65+ | <10 |
| | Unknown | <10 |
| | | |
| Gender | Female | 43 (31.2 %) |
| | | |
| Race/Ethnicity | Hispanic | 83 (60.1 %) |
| | Black or AA | 14 (10.1 %) |
| | Asian | 11 (8.0 %) |
| | Other (<10 cases each) or Unknown | 30 (21.7 %) |
| | | |
| Has patient been hospitalized? | Yes | <10 |
| | | |
| Has patient died? | Yes | <10 |
| | | |

Manufacturing related outbreaks

The manufacturing sector has also been impacted by outbreaks, with a high proportion of tests returned positive (79.0%) among individuals tested in association with these outbreaks. A total of 343 cases have been identified, impacting primarily Hispanic adults as well as those of Black, non-Hispanic White, and Other racial or ethnic groups, with a mean age of 41. These outbreaks have resulted in 17 hospitalizations.

Figure 15: All tests associated with a manufacturing outbreak

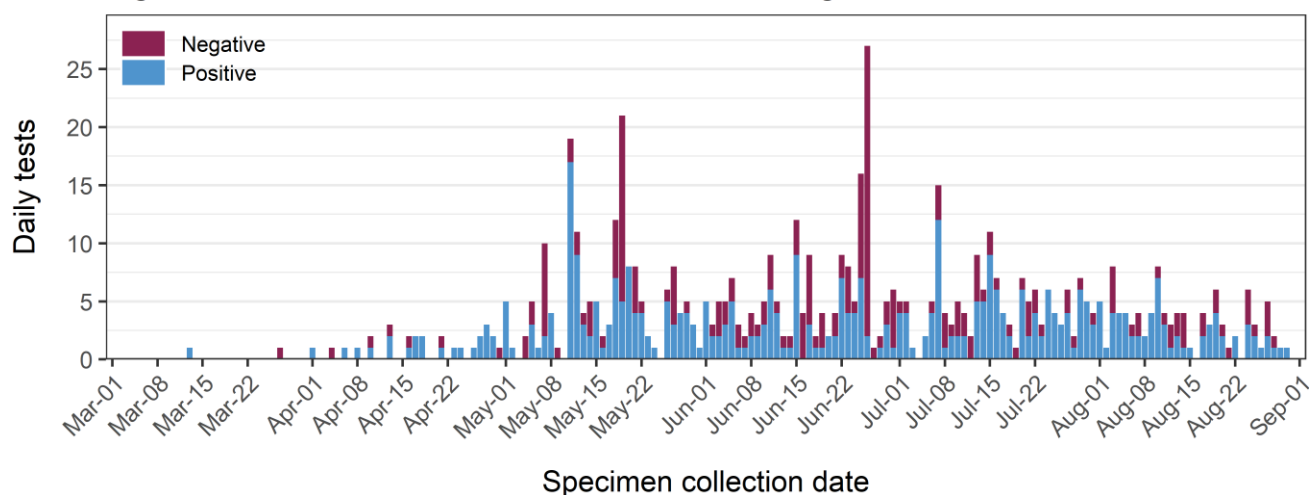


Table 5: Summary of 343 confirmed cases in manufacturing settings (104 unique outbreak IDs)

| Confirmed cases (N = 343) | | |
|---------------------------------------|-----------------------------------|----------------------|
| Age | Mean (SD) | 40.55 (12.24) |
| | Median [Q1, Q3] | 40.00 [31.00, 50.00] |
| Age category | < 18 | <10 |
| | 18-39 | 164 (47.8 %) |
| | 40-64 | 175 (51.0 %) |
| | 65+ | <10 |
| | Unknown | <10 |
| Gender | Female | 104 (30.3 %) |
| Race/Ethnicity | Hispanic | 145 (42.3 %) |
| | White | 75 (21.9 %) |
| | Black or AA | 53 (15.5 %) |
| | Asian | 39 (11.4 %) |
| | Other (<10 cases each) or Unknown | 31 (9.0 %) |
| Has patient been hospitalized? | Yes | 17 (5.0 %) |
| Has patient died? | Yes | <10 |

School, childcare, child sports instruction, and summer camp related outbreaks

Increases in childcare related cases began in June and July, with very high percentages of positive tests. A total of 128 cases associated with childcare facilities have been identified, primarily affecting young females (mean age 25). Approximately 31% of these cases are among children under 18.

Figure 16: All tests associated with a childcare or school related outbreak

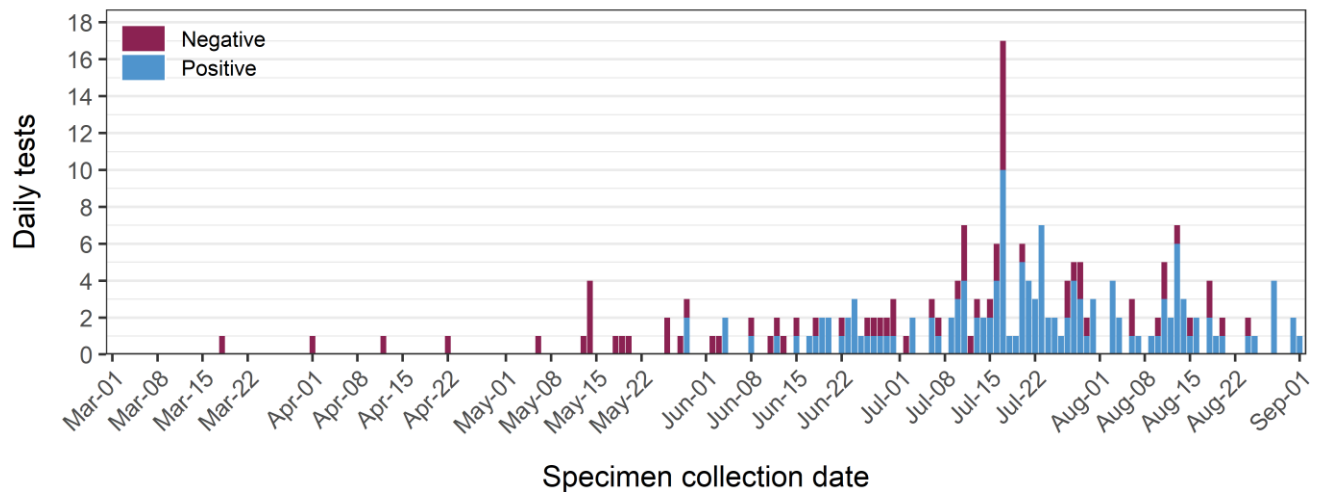


Table 6: Summary of 128 confirmed cases in school or childcare settings (76 unique outbreak IDs)

| Confirmed cases (N = 128) | | |
|--------------------------------|-----------------------------------|----------------------|
| Age | Mean (SD) | 25.48 (16.23) |
| | Median [Q1, Q3] | 25.00 [11.00, 37.25] |
| | | |
| Age category | < 18 | 40 (31.2 %) |
| | 18-39 | 59 (46.1 %) |
| | 40-64 | 29 (22.7 %) |
| | 65+ | <10 |
| | Unknown | <10 |
| | | |
| Gender | | |
| | Female | 97 (75.8 %) |
| Race/Ethnicity | | |
| | Black or AA | 59 (46.1 %) |
| | White | 43 (33.6 %) |
| | Hispanic | 18 (14.1 %) |
| | Other (<10 cases each) or Unknown | 8 (6.2 %) |
| Has patient been hospitalized? | | |
| | Yes | <10 |
| Has patient died? | | |
| | Yes | <10 |

Bar and restaurant related outbreaks

There are a total of 123 cases associated with outbreaks occurring at bars and restaurants, with most of the cases occurring in July and August and a high proportion of individuals testing positive. Whites and Hispanics are most impacted by these outbreaks, with a mean age of 35.

Figure 17: All tests associated with a bar or restaurant outbreak

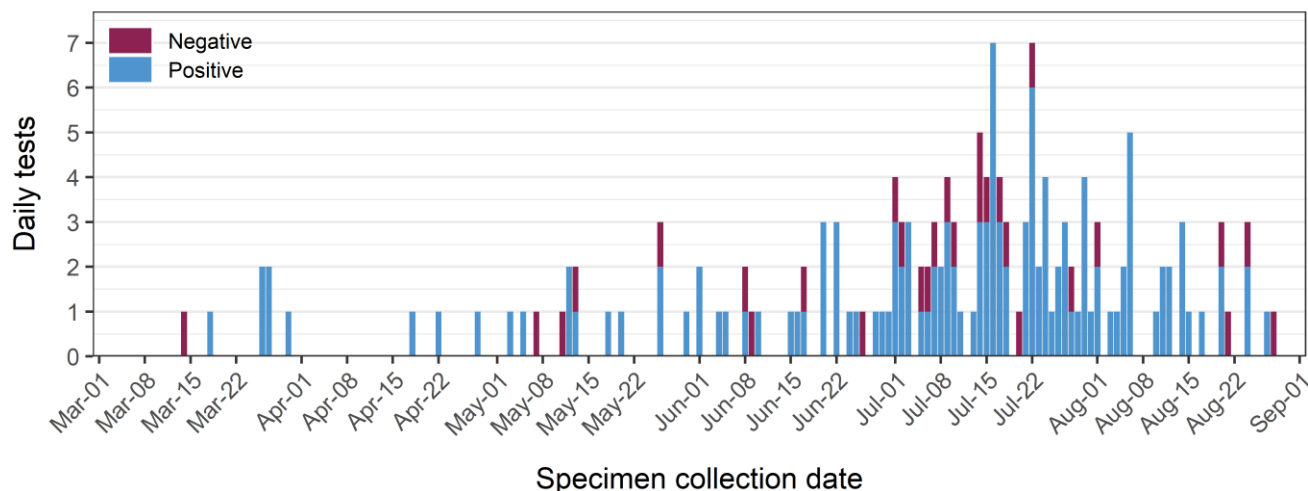


Table 7: Summary of 123 confirmed cases in bars and restaurants (53 unique outbreak IDs)

| Confirmed cases (N = 123) | | |
|--------------------------------|-----------------------------------|----------------------|
| Age | Mean (SD) | 34.51 (15.44) |
| | Median [Q1, Q3] | 31.00 [21.00, 46.50] |
| Age category | < 18 | <10 |
| | 18-39 | 73 (59.3 %) |
| | 40-64 | 39 (31.7 %) |
| | 65+ | <10 |
| | Unknown | <10 |
| Gender | Female | 64 (52.0 %) |
| Race/Ethnicity | White | 67 (54.5 %) |
| | Hispanic | 39 (31.7 %) |
| | Other (<10 cases each) or Unknown | 17 (13.8 %) |
| Has patient been hospitalized? | Yes | <10 |
| Has patient died? | Yes | <10 |

Data Sources & Acknowledgments

This report was created by faculty and staff in the Medical College of Wisconsin (MCW) Institute for Health and Equity (IHE) in partnership with Milwaukee County collaborators who serve on the Epidemiologic Intelligence team. Data sources include the Wisconsin Electronic Disease Surveillance System (WEDSS), the US Census Bureau, the Milwaukee County Medical Examiner's office, the Emergency Medicine Resource, and publicly available data obtained from local health and emergency response agencies. This work was funded by the Advancing a Healthier Wisconsin Endowment at the Medical College of Wisconsin.

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